Victorian Desalination Project

D&C Utilities – Environmental Management Plan

Attachment B – Project Components

DOCUMENT NUMBER					
TDV	0	EV	PC	0012.B	03

ATTACHMENT B – Project Components

This attachment describes the activities associated with design and construction of the Utilities components of the Victorian Desalination Project which comprises the transfer pipeline that transports desalinated water to Melbourne Water's Cardinia-Pearcedale main at Berwick and the high voltage power line to provide power from the Cranbourne Terminal Station to the desalination plant at Wonthaggi.

Figure 1 shows the alignment of the utilities. The Power Supply and the Transfer Pipeline are co-located in a common easement for 78km from the desalination plant site at Wonthaggi to 6km south of the Cardinia-Pearcedale main at Berwick. At this location the power supply corridor diverges to follow an existing power line easement for 8km to the Cranbourne Terminal Station (referred to as the Cranbounre extension). The utilities corridor is typically 40m wide consisting of a 20m permanent easement with an additional 20m for construction period. The Cranbounre extension corridor will consist of a 10m wide easement and an additional 5m for construction. The utilities corridor is locally constricted to avoid or minimise impacts to sensitive areas while extra work spaces locally extend beyond the typical corridor for stockpiling of bedding material, spoil and for lay down areas.

Table 1 shows the key design, construction and commissioning activities associated with the utilities.

Table 1: Area 3 – Utilities - Key activities

Activity	Description	Permanent or Temporary
Site establishment	• Pre-construction surveys including features, geotechnical, flora and fauna. • Archaeological salvage of Aboriginal cultural heritage artefacts as required by Cultural Heritage Management Plans approved by Aboriginal Affairs Victoria. • Establishment of access agreements with landowners • Service identification and relocation.	Temporary
Clear and grade	• Clearing of vegetation • Strip and stockpile 150mm topsoil for reinstatement • Construction of temporary haul road	Temporary
Transfer pipeline		
Earthworks	• Excavation of pipe trench to enable pipe laying	Permanent
Standard pipe-lay	• Place bedding material. • Lay, weld, wrap and grout pipe sections. • Place and compact haunching material. • Backfill and compact trench.	Permanent
Open trench waterway and road crossings	• Install temporary dams and bypass pumps across watercourses where required • Trench waterway following standard pipe-lay technique	Temporary

Activity	Description	Permanent or Temporary
Pipe Jack waterway crossings	• Sheet pile and excavate launch and receipt pits on either side of crossing • Install tunnel boring machine (TBM) and hydraulic drive shafts • Bore crossing and install concrete jacking pipes • Install steel water pipe within the concrete jacking pipe • Install risers • Backfill pit and demobilise.	Permanent
Install appurtenances	• Install air valves, scour valves, isolation valves and delivery points.	Permanent
Earthing	• Installation of double grading ring and deep well electrodes at air valves, delivery points and isolation valves.	Permanent
Cleaning	• Remove all waste, water and other debris. • Mechanically clean pipeline.	Temporary
Hydrotest	• Fill pipeline with water from the Cardinia-Pearcedale main at Berwick and hydrotest in four sections. • Hypochlorinate hydrotest water to disinfect pipeline.	Temporary
Transfer pipeline facilities		
Booster pump station and two surge vessels	• Civil earthworks • Construct concrete footings • Building construction and fit-out • Installation of pump station equipment and associated instrumentation	Permanent.
Power supply		
Standard HVAC power supply cable and ancillary fibre-optic cables	• Excavation, trenching and placement of three conduits in trefoil arrangement. • Backfill with thermal backfill. • Pull High Voltage Alternating Current (HVAC) power supply cables into conduits and joint • Installation of two fibre-optic cables within power supply trench	Permanent
Open trench waterway and road crossings	• Install temporary dams and bypass pumps across watercourses where required • Trench waterway following standard power-lay technique	Temporary
Pipe Jack waterway crossings	• Utilise same launch and receipt pits used by transfer pipeline • Install tunnel boring machine (TBM) and hydraulic drive shafts • Bore crossing and install concrete jacking pipes • Install power cable conduit within the concrete jacking pipe • Backfill pit and demobilise.	Permanent
Power Supply facilities		

Activity	Description	Permanent or Temporary
Cranbourne Terminal Station Two Reactive Compensation Stations Wonthaggi Desalination Plant (WDP) Transformers	• Civil earthworks • Construct concrete footings • Building construction and fit-out • Installation of equipment and associated instrumentation	Permanent
Fibre Optic Line Line 1	• Plough in 50mm conduit. • Horizontal Directional Drill (HDD) minor waterways and road crossings. • Blow Fibre Optic line through conduit.	Temporary
Site reinstatement and rehabilitation		
Site reinstatement and rehabilitation	• Rehabilitation and reinstatement of utilities corridor in accordance with agreements with landowners and landscape design packages	Permanent

Figure 1: Utilities alignment

1 Transfer Pipeline

The transfer pipeline delivers water from the desalination plant at Wonthaggi to Melbourne Water's Cardinia-Pearcedale main at Berwick (Delivery Point 1). There are six additional delivery points to transfer water to regional townships and reservoirs between Wonthaggi and Cardinia. The transfer pipeline also includes a Booster Pump Station and two surge tanks.

1.1 Transfer Pipeline

The water transfer pipeline is a 1930mm diameter mild steel cement lined pipeline delivered to site in 12m lengths. The wall thickness of the pipeline ranges from 12-20mm depending on the depth at which the pipe is laid and the character of the material in which it is being laid.

The pipeline will be laid underground with a minimum cover of 800mm. The depth of the pipe will increase with vertical bends to in order to remain underground beneath topographical low points such as waterways. In flat areas the pipe will follow a saw tooth profile to create artificial high points for air valves while maintaining the minimum 800mm cover.

Road and waterway crossings will utilise tunnelling (pipe jacking) or modified standard trenching.

1.2 Booster Pump Station

The Booster Pump Station (BPS) at Cardinia assists the transfer pump station at the desalination plant site (Area 2) to pump water along the pipeline, however will only operate when flows exceed 100GL/yr (equivalent to 296 Ml/day). Flows under 100GL/yr will be transferred directly from the storage dams at the plant site to Delivery Point 1 by the transfer pump station.

The BPS will be constructed on a concrete slab on a compacted fill pad and the pumps are located below the final ground level. The main pumping station, electrical switch room and transformers will be housed in a framed steel structure with pre-cast concrete external walls panels for acoustic reduction and fire protection.

Earth mounds planted with native vegetation will be located to the north, north west, south and east of the BPS outside of security fencing.

1.3 Surge Tanks

Two surge tanks located at the highest topographical points along the pipeline ensure that the maximum and minimum pressure along the pipeline remain within the design limits including during an uncontrolled event such as a power failure at the transfer pump station or BPS. Without the surge vessels, the transient waves of a water hammer may result in the air entering the pipe.

1.4 Valves

The transfer pipeline will be completely underground with the exception of air scour and isolation valves. Air valves release air from the pipeline during filling, during normal operation and allow air into the pipeline during controlled drainage events. Scour valves drain the pipeline to facilitate maintenance or in the event of off-specification water. Isolate valves isolate sections of the pipeline to facilitate maintenance. All valves require above ground structures to access the pipeline.

1.5 Testing and Commissioning

Prior to operation and maintenance, the transfer pipeline will be subject to cleaning, hydrostatic testing and commissioning.

Pipe cleaning is required prior to close out of any permanent or temporary manways to effectively 'seal' sections of the pipe, as such the Temporary Manhole Reinstatement Inspection and Test Plan (ITP-03-63-4000-001_04 Rev 4) includes verification that the pipe is clean and free of all debris. This Inspection is undertaken and signed off by delegated Quality Control representative prior to the commencement of manhole reinstatement in accordance with the Temporary Manhole Reinstatement Pre-Commencement Checklist (PLV-3-CN-CK-0033-00).

Pipeline cleaning is involves removal of construction waste, sediment (soil and mud) and water from within the pipe. Where required, the pipeline may be using pressure hose and squeegees to assist with the removal of sediment or construction waste. No cleaning agents or chemical additives are used in cleaning of the pipeline.

The hydrostatic testing (hydrotest) is required to test if there is any leakage from the pipe, valves or manholes. The hydrotest will be completed in four sections from north to south with water being drawn from the Cardinia Reservoir via the Cardinia Reservoir Inlet Feed Line (an existing pipeline that links the DN1930 Desalination Transfer Pipeline to the Cardinia Reservoir approximately 17km to the north). As the Cardinia Reservoir Inlet Feed Line forms part of the existing Melbourne Water Network, water filling the pipe will be potable water (mineralised with chlorine, fluoride and lime).

During the flooding of the pipeline, the hydrotest water will be hypochlorinated up to 5-ppm by injecting a 10% chlorine solution (sodium hypochlorite) to prevent the growth of bacteria or other pathogens. The air valves will be opened during filling of the pipeline to allow air to be expelled. Exercising of sour valves has been eliminated by pneumatically testing the valves before hydrotest. .

Following a stabilisation period the test section will be pressurised and upon satisfactory completion the water from this test section will be depressurised into the next test section with consequent filling from Cardinia Reservoir. This process will be repeated for each of the four test sections.

The commissioning process will involve approximately 20ML of water from the transfer pipeline being drawn into a retention tank at the desalination plant site and then pumped to and from Cardinia Reservoir through the pipeline, one to several times a week, to test the pumping systems. Commissioning of the pipeline and booster pumps and the subsequent discharge of the hydrotest and commissioning water is detailed in the Commissioning Environmental Sub Plan (TDV-0-EV-SB-0021.I) attached to the D&C EMP.

2 Power Supply

Power supply will be delivered to the Desalination Plant by a 220kV high voltage alternating current (HVAC) underground power supply emanating from Cranbourne Terminal Station. In addition to the underground power cables, provision of the power supply will require upgrade of the Cranbourne Terminal Station, two Reactive Compensation Stations and a transformer at the Desalination Plant.

2.1 Power Cable

The 220kV cable system comprises of three single core 220kV cables laid in a trefoil arrangement. Each 220kV power cable will consist of a copper conductor, Cross linked polyethylene (XLPE) insulated single-core cable with a nominal diameter of 115mm and weight of 13kg/m. The power cables will be delivered in 1200m coils.

The power cable will be laid in a typical trench 800mm wide and 1550mm deep to provide 1200mm minimum cover and encased in a thermal bedding of flowable low strength (3MPa) cement stabilised backfill. Trenchless crossings may utilise horizontal directional drilling (HDD) or pipe jack construction techniques.

North of the Booster Pump Station (Kilometre Point [KP] 74) the power supply will be direct buried. South of the Booster Pump Station to the desalination plant the power supply will be contained within 180mm HDPE conduits through which the cables will be pulled through following backfill of the trench.

Aboveground surface markers will be installed at 100m intervals and at any change of direction above the centreline of the cable route. Submarine cable warning signs will be erected over the centreline of the cable at creek crossings.

2.2 Cranbourne Terminal Station (CBTS)

A new double switched 220kV bay will be established at the existing CBTS to provide a 220kV connection point for the VDP. Cable termination equipment will be established at the connection point for termination of the new underground 220kV cable.

Line Protection and Control, Compensation Reactive Device Control (CRDC), Revenue and Check Metering, Quality of Supply Monitoring and Communications schemes will be established for this new VDP connection.

2.3 Reactive Compensation Stations

The power supply system includes two reactive power compensation stations to be erected at the Booster Pump Station (Northern Reactive Compensation Station) and north of the Holden Proving Ground (Southern Reactive Compensation Station).

The Northern Reactive Compensation Station (NRCS) will be established to provide Reactive Compensation and to provide BPS with a 22kV supply. The Booster pumps are required on the transfer pipeline to assist in the delivery of water. The BPS 22kV switchboard will be supplied via two off 220/22 kV 25MVA transformers. A Reactive Compensation Device Control scheme will be established at this location and include two off 54.7MVAr three phase oil filled Compensating Reactive Devices (CRDs) and associated primary and secondary equipment.

The Southern Reactive Compensation Station (SRCS) will be established to provide Reactive Compensation. A Compensation Reactive Device Control scheme will be established at this location and include two off 54.7MVAr three phase oil filled Compensating Reactive Devices (CRDs) and associated primary and secondary equipment.

Duplicate Communication Circuits will be provided between the sites via the supervisory control and data acquisition (SCADA) fibre optic cables.

2.4 Wonthaggi Desalination Plant (WDP) Transformers

Connection of the power supply at the Desalination Plan (WDP) will comprise two off 220/22kV 80/150MVA transformers supplying the Desalination Plant main 22kV switchboards. In view of the proximity to the sea, the 220kV switchgear will be indoor gas insulated (GIS).

2.5 Optical Communication Fibres

Two fibre optic cables will be installed in the power supply trench. One SCADA cable which to provide communication along the power supply and one DTS (distributed temperature sensing) cable to monitor the temperature of the power supply cables.

A third SCADA cable will be laid in a separate trench on the eastern side of the pipeline to provide communication along the transfer pipeline. The pipeline SCADA cable will be laid post-pipeline installation in a separate trench, except at crossings where a PVC conduit will be installed to allow the cable to be pulled through post construction.

The SCADA cables will also provide back up for one another and capacity for community purposes.

2.6 Below Ground Structure

Below ground joint bays, link boxes and optical fibre pits will be will be required along the power supply which will be consist of pre-fabricated reinforced concrete structures.

2.7 Testing & Commissioning

Prior to the commencement of (and during) testing and commissioning, detailed approved testing documentation of the power supply infrastructure will be prepared. This analysis is completed to verify that the infrastructures have been built in accordance with the ‘approved for construction’ design and the close out of the work packages. Pre-handover from construction to commissioning inspections of all infrastructures will also be completed.

Energisation and testing of the power supply infrastructure plant and equipment will be conducted in each of the stations, and then verified across all four stations once the communications infrastructure is available. Where required temporary generator sets will be used to perform various required tests of the infrastructure plant and equipment. Testing will also be conducted on all Earthing; Communication; AC/DC; Power Control and Overall protection systems in accordance with the approved designs. When it is verified that all systems are working correctly, final energisation will occur following the final connection of the power supply infrastructure to the SP Ausnet transmission supply system.